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FILTER WITH ROTATING BACKWASH SELECTOR

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ABSTRACT OF THE DISCLOSURE

A filter assembly having a plurality of individual filter units, each including an impervious outer skirt surrounding an elongated filter member. A fluid-solid mixture is supplied to the filter units in a direction to flow radially inwardly through the filter member. Rotatable backwash arms are disposed adjacent the opposite ends of the filter units for sequentially and progressively permitting backwashing thereof. The backwash fluid flows radially outwardly through the filter members for removing the collected solid material. The backwash arms are connected to inlet and outlet pipes, with the inlet pipe being connected to an external source of a separate backwash fluid. The backwash arms are rotatably driven by means of an external drive system which includes disconnectible means for enabling one end of the filter housing to swingably move into an open position, carrying with it the backwash arm connected thereto, for permitting servicing of the individual filter units.

FIELD OF THE INVENTION

This invention relates to a filter assembly and, in particular, to an improved filter assembly having a plurality of individual filter units and a pair of rotatable backwash arms positionable adjacent the opposite ends of each filter unit for permitting backwashing of the individual filter units by means of a separate backwash fluid.

BACKGROUND OF THE INVENTION

It is well known that filter assemblies used for removing solid particles from a liquid or gas must have the filters periodically cleaned in order to permit a continuous throughflow while at the same time perform an effective filtering operation. Most known filter assemblies containing a plurality of individual filter units have utilized a rotatable backwash arm which is sequentially positionable adjacent the filter units for permitting backwashing of the individual filter units for removing the collected solid material. The backwashing operation in this type of filter assembly normally utilizes the filtrate for backwashing, the filtrate being allowed to flow backwards through the filter units for removing the solid particles from the filter screen. While the use of the filtrate is effective for removing the solid materials deposited in the filter unit, nevertheless use of the filtrate is often undesirable since the filtrate in many situations is a costly solution which is preferably utilized for some other purpose. Thus, having to utilize a portion of the filtrate for backwashing purposes results in an inefficient, and often costly, wastage of the filtrate.

A further disadvantage of many known filter assemblies has been their inability to completely and efficiently remove all of the solid material from the filter. Many known filter assemblies have utilized elongated sleeve-like filter members for removing the solid material from the gas or liquid, the mixture as supplied to the filter being supplied to the interior thereof whereby the liquid or gas then flows radially outwardly through the filter with the solid material being deposited on the internal wall of the filter. While this flow pattern is effective in removing the solid material from the mixture, nevertheless cleaning of the filter cannot be thorough since the amount of backwash fluid (or filtrate) flowing inwardly through the filter will only be that amount sufficient to equalize the pressure in the outlet drain for the backwash flow. Solids will only be removed from that portion of the filter screen sufficient to provide enough open screen area to allow sufficient backwash flow for this pressure equalization. Thusly, it can be seen that there is no direct relationship between backwash fluid flow and removal of solid particles from the internal surface or the filter screen.

Accordingly, it is an object of the present invention:

(1) To provide an improved filter assembly having an improved backwash system for improving the backwash efficiency, minimizing the backwash time, and maximizing the operational time and throughput of the filter assembly.

(2) To provide a filter assembly, as aforesaid, wherein a plurality of individual filter units are disposed adjacent one another, such as in a circular pattern, with the opposite ends of the individual filter units being cooperable with rotating backwash arms for permitting the individual filter units to be backwashed by means of a separate backwash fluid.

(3) To provide a filter assembly, as aforesaid, wherein the individual filter units each include a cylindrical filter element mounted so that the solid material is deposited on the outer circumferential periphery thereof, whereby the backwash fluid then flows radially outwardly through the filter elements to thereby permit the use of a diffuser internally of the filter to cause removal of deposited solids from the filter screen over the complete length thereof.

(4) To provide a filter assembly, as aforesaid, wherein the pair of rotating backwash arms are rotatably mounted on heads disposed adjacent the opposite ends of the filter housing, with the rotating backwash arms being drivingly interconnected by a simple disconnectible drive located externally of the housing for permitting one of the heads to be pivotally swung open for permitting easy replacement of the filter elements.

(5) To provide a filter assembly, as aforesaid, which results in an efficient backwash operation which effectively results in removal of substantially all of the collected solid material in a short backwash time, while at the same time permitting each filter unit to be operationally utilized for filtering purposes for a maximum amount of time so as to produce the maximum amount of filtrate, with none of the filtrate being utilized for backwashing purposes.

(6) To provide a filter assembly, as aforesaid, which does not require the use of closely fitting fluid tight seals between the adjacent ends of the filter units and the rotating backwash arms, flow through the outlet pipe of the backwash system being controlled by means of a valve.

Other objects and purposes of the present invention will be apparent to persons acquainted with devices of this type upon reading the following specification and inspecting the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a filter assembly constructed according to the present invention.

FIG. 2 is a cross-sectional view taken along the line II—II of FIG. 1.

FIG. 3 is a fragmentary cross-sectional view taken along the line III—III of FIG. 1.

Certain terminology will be used in the following description for convenience in reference only and will not be limiting. The words "upwardly," "downwardly," "leftwardly" and "rightwardly" will refer to directions in the drawings to which reference is made. The word "for-